

**Statement of**  
**Steven L. McCabe, Ph.D., P.E.**  
**On behalf of the**  
**Wind Hazard Reduction Coalition**  
**Before the**

**Joint Hearing of the**  
**Subcommittee on Environment, Technology and Standards**  
**And the**  
**Subcommittee on Research**  
**Of the**  
**Committee on Science**  
**U.S. House of Representatives**

**March 24, 2004**

Good afternoon, I am Dr. Steven L. McCabe, a Professor in the Department of Civil, Environmental and Architectural Engineering at the University of Kansas. I am currently on leave and working as Program Director, Structural Systems and Hazards Mitigation in the Directorate for Engineering, Civil and Mechanical Systems Division for the National Science Foundation.

I am testifying today on behalf of the Wind Hazards Reduction Coalition and the American Society of Civil Engineers of which I am a member. The Wind Hazard Reduction Coalition was formed due to the recognized need for better research and action (or mitigation) into predicting and mitigating the damage from major wind events.

The Coalition would like to thank Chairman Smith and Chairman Ehlers as well as full Committee Chair Boehlert for their leadership in holding this hearing and their commitment to moving ahead on this issue. The Coalition also wishes to express its thanks to Mr. Neugebauer and Mr. Moore for their hard work and sponsorship of H.R. 3980.

The Wind Hazards Reduction Coalition would like to formally endorse H.R. 3980, the National Windstorm Impact Reduction Act of 2004. This bill represents five years of work in which stake holders representing a broad cross-section of interests such as the research, technology transfer, design and construction, and financial communities; materials and systems suppliers; state, county, and local governments; the insurance industry, have participated in crafting this legislation. This bill represents a consensus of all those with an interest in the issue and a desire to see the benefits this legislation will

generate. The Coalition would be remiss if we did not acknowledge the contribution of Committee staff on both sides of the aisle for their work on this important issue.

### **A. The Wind Hazard Problem**

All 50 states are vulnerable to the hazards of windstorms. In 1998, hurricanes, tornadoes and other wind related storms caused at least 186 fatalities and more than \$5.5 billion in damage. During the week of May 4-10, 2003, a record 384 tornadoes occurred in 19 states, including Kansas, Missouri, Oklahoma and Tennessee resulting in 42 fatalities. On May 3, 1999, more than 70 violent tornadoes struck from north Texas to the Northern Plains. Forty-one people died and more than 2,750 homes were damaged. In 1992, Hurricane Andrew resulted in \$26.5 billion in losses and 61 fatalities, in 1989, Hurricane Hugo resulted in \$7 billion in losses and 86 fatalities and in 1999, Hurricane Floyd resulted in more than \$6 billion in losses and 56 deaths.

The United States currently sustains billions of dollars per year in property and economic loss due to windstorms. The Federal government's response to such events is to initiate search and rescue operations, help clear the debris and provide financial assistance for rebuilding. The Coalition is calling upon the Federal government to provide increased research funding to mobilize the technical expertise already available to help reduce the significant annual toll in casualties and property damage from windstorms.

The Wind Hazard Reduction Coalition currently represents 23 associations and companies which are committed to the creation of a National Wind Hazard Reduction Program (NWHRP) that would focus on significantly reducing loss of life and property damage in the years to come. The Coalition includes professional societies, research organizations, industry groups and individual companies with knowledge and experience in dealing with the impact of high winds.

Near-surface winds are the most variable of all meteorological elements, making the prediction and control of their impacts all the more challenging. In the United States the mean annual wind speed is 8 to 12 mph, but wind speeds of 50 mph occur frequently throughout the country, and nearly every area occasionally experiences winds of 70 mph or greater. In coastal areas of the East and Gulf coasts, tropical storms may bring wind speeds of well over 100 mph. In the middle of the country, wind speeds in tornadoes can be even higher.

With the average annual damage from windstorms at more than \$6 billion, the current \$5-10 million Federal investment in research to mitigate these impacts is inadequate. In contrast, the Federal government invests nearly \$100 million per year in reducing earthquake losses through the National Earthquake Hazards Reduction Program, a program that has led to a significant reduction in the effects of earthquakes. A Federal investment in wind hazard reduction would pay similar or greater dividends in saved lives and decreased property damage.

Unfortunately, reducing vulnerability to wind hazards is not just a question of developing the appropriate technical solution. Wind hazards are created by a variety of

events with large uncertainties in the magnitudes and characteristics of the winds. The relevant government agencies and programs, as well as the construction industry, are fragmented. Finally, implementation requires action by owners and the public, who may not consider hazard reduction a high priority. Solving wind vulnerability problems will require coordinated work in scientific research, technology development, education, technology transfer and public outreach.

In 1993, the National Research Council (NRC) published a report entitled “Wind and the Built Environment.”<sup>1</sup> The report included the recommendations of the Panel on the Assessment of Wind Engineering Issues in the United States. The panel recommended the establishment of a national program to reduce wind vulnerability. Such a program would include wind research that draws upon the expertise of both academia and industry and addresses both structural and nonstructural mitigation methods, an outreach program to educate state and local governments on the nature of the wind risks they face, a conscious effort to improve communication within the wind community and a commitment to international cooperation in wind-engineering.

A 1999 NRC study concurred with that recommendation and specifically urged Congress to designate “funds for a coordinated national wind-hazard reduction program that encourages partnerships between federal, state and local governments, private industry, the research community, and other interested stakeholders.”<sup>2</sup>

## **B. Federal Government & Congressional Action**

As far as preventing or minimizing the impact of major wind events, the Federal government has mainly limited itself to improvements in weather prediction and public warnings. In light of the damages and loss of life that windstorms cause every year, the Coalition strongly feels that the Federal government can and should do more.

To that end, the Wind Hazard Reduction Coalition has worked with Congressmen Dennis Moore of Kansas, Walter Jones of North Carolina, and others, first to help form the Congressional Wind Hazard Reduction Caucus and then to develop legislation. The Caucus was created in October of 1999 and is chaired by Mr. Moore and Mr. Mario Diaz Balart. It has as its goal to increase Congress’ awareness of the public safety and economic loss associated with major wind events and to establish and fund programs to mitigate those impacts.

On October 19, 2000, Congressmen Moore and Jones and others introduced H.R. 5499, the Windstorm Hazard Reduction Research and Technology Transfer Act.” The Coalition supported the development of this legislation by providing technical advice.

That legislation has evolved and been reintroduced in both the 106<sup>th</sup> and 107<sup>th</sup> Congresses. The current bill, H.R. 3980, represents the final evolution of the legislation.

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<sup>1</sup> National Research Council, Wind and the Built Environment (1993).

<sup>2</sup> National Research Council, Review of the Need for a Large-scale Test Facility for Research on the Effects of Extreme Wind on Structures, (1999).

### **C. The National Windstorm Impact Reduction Act of 2004 (HR 3980)**

The Wind Hazards Reduction Coalition would like to formally endorse H.R. 3980, the National Windstorm Impact Reduction Act of 2004. This bill represents five years of work in which stake holders representing a broad cross-section of interests such as the research, technology transfer, design and construction, and financial communities; materials and systems suppliers; state, county, and local governments; the insurance industry, have participated in crafting this legislation. This bill represents a consensus of all those with an interest in the issue and a desire to see the benefits this legislation will generate. Additionally, much of what is contained in the bill was highlighted in two recent reports.

In 2003, the Rand Corporation released a report entitled, “Assessing Federal Research and Development for Hazard Loss Reduction”. This report is one of the focuses for this hearing. The findings of the report are consistent with and support the goals of the coalition. Specific recommendations for a research and implementation program are contained in the report released by the American Association for Wind Engineering and the American Society of Civil Engineers entitled “Wind Engineering Research and Outreach Plan to Reduce Losses Due to Wind Hazards.” Both reports support programs which would encompass four focuses:

- Understanding of Wind Hazards - developing a greater understanding of severe winds, quantify wind loading on buildings, structures and infrastructure and developing wind hazards maps;
- Assessing the Impact of Wind Hazards – assessing the performance of buildings, structures and infrastructure under severe winds, developing frameworks and tools for simulations and computer modeling and developing tools for system level modeling and loss assessment;
- Reducing the Impact of Wind Hazards – developing retrofit measures for existing buildings, structures and infrastructure, developing innovative wind-resistant technologies for buildings, structures and infrastructure and developing land measures and cost effective construction practices consistent with site-specific wind hazards; and
- Enhancing Community Resilience, Education and Outreach – enhancing community resilience to wind hazards, effective transfer to professionals of research findings and technology and development of educational programs and public outreach activities.

### **D. Coalition Comments Regarding HR 3980**

The Wind Hazard Reduction Coalition has concerns with two aspects of the legislation.

First, there is no new federal money authorized in the legislation to address the problem of wind hazards, the legislation merely asks for the shifting of resources within federal agencies. The Coalition is concerned that federal agencies will resist

implementing this new program without any new funding. In support of new funding it is clear that the average of \$22 million in authorized funds in HR 3980 is small sum compared to the \$4 billion in average annual loss from windstorms.<sup>3</sup> We strongly believe that the small federal investment in the wind hazard program will pay large dividends in the near term in decreased loss of both life and property, in essence paying for itself.

Second, the Coalition strongly supports the creation of the National Advisory Committee on Windstorm Impact Reduction. The group of outside experts will be instrumental in guiding the new program and ensuring its success. The Coalition believes that this Advisory Committee can be done in a cost-effective fashion if partnerships are formed with interested parties such as the International Code Council, American Society of Civil Engineers, American Association of Wind Engineers, National Fire Protection Association and others who hold meetings of relevant experts. In this way resources can be leveraged for the benefit of the program.

In addition, we would like to note an opportunity being presented by the work at the George E. Brown, Jr. Network for Earthquake Engineering Simulation which is nearing operation. This national laboratory enables researchers from all parts of the country to collaborate in studying the effects of earthquake motions on structures and to improve their performance. Taking advantage of the Information Technology infrastructure of NEES, the wind community can develop a wind analog to the NEES system enabling wind researchers to collaborate in a similar manner to their earthquake engineering colleagues. Moreover, several of the NEES equipment sites could be utilized in the study of structural response to windstorms, thus leveraging the investment made by Congress in funding NEES.

The Coalition also observes that the lessons learned from the Earthquake Hazards Reduction Program (NEHRP) has shown that research into such social science issues as emergency preparedness and response, search and rescue, the delivery of emergency medical care, public and governmental adoption of mitigation measures, neighborhood and business citizen volunteer programs, and linking disaster recovery to mitigation were essential. Appropriate attention to social science research and implementation issues also should be a part of this effort to reduce the effects of severe windstorms.

## **E. Conclusion**

Windstorm-related costs have averaged several billion dollars per year during the last decade with a high in 1992 exceeding \$25 billion, primarily as a result of Hurricane Andrew. If a severe hurricane makes landfall in Miami, New Orleans, or New York City, the damage could exceed \$50 billion with significant impact on the national economy in addition. Hurricanes, tornadoes, and other windstorms cause death and injury, business interruption, and unacceptably high levels of property damage in all 50 States and all U.S. territories. People continue to move to coastal areas adding to the trend toward larger disasters. Damage costs will continue to increase unless an effective wind hazard reduction plan is implemented.

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<sup>3</sup> Congressional Testimony, Charles Meade, "Strengthening Research and Development for Wind Hazard Mitigation, February 9, 2004, House Science Committee.

A unified national plan of wind hazard reduction, such as contained in H.R. 3980, has the potential of reducing losses significantly in the next decade. Currently, a limited number of independent activities are underway to reduce the disastrous effects of windstorms. Unfortunately, these activities will have a limited impact on reversing the trend of increasing costs unless action is taken to improve the resistance of the physical infrastructure that is now susceptible to damage by windstorms.

Finally, the Coalition would be remiss if we did not acknowledge the contribution of Committee staff on both sides of the aisle for their work on this important issue.

Once again, thank you for the opportunity to testify. I would be pleased to answer any questions you might have.